# MONTHLY WEATHER REVIEW.

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## INTRODUCTION.

The MONTHLY WEATHER REVIEW for May, 1903, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph and mail, 160; West Indian service, cable and mail, 8; River and Flood service, 52, river and rainfall, 177, rainfall only, 62; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 2962; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Territorial Meteorologist, Honolulu, H. I.; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. M. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard of time is that of San José, $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time, corresponding to $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

## FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

In the United States the weather of May, 1903, presented strikingly abnormal features. New England, and the greater part of New York, received practically no rain from the 4th until the closing days of the month. In the Middle Atlantic States an unbroken period of dry weather extended from the 4th to the 22d. Excessive rains fell in the South Atlantic States from the 6th to the 15th. In the Ohio Valley, Tennessee, the Gulf States, and the greater part of the Lake region the rainfall was abundant. In the Pacific coast States the month was unusually dry. During the last decade of the month, and more particularly from the 24th to the 27th, a succession of severe local storms, some of which developed into tornadoes, visited the States of the lower Missouri and upper Mississippi valleys. From the 19th until the close of the month excessive rains over the water sheds of the lower Missouri and upper Mississippi rivers produced floods that in the lower Missouri Valley were the most formidable that have occurred since 1844.

### THE SEVERE LOCAL STORMS OF MAY 24 TO 27 IN THE MIDDLE-WESTERN STATES.

Excessive atmospheric heat and moisture are recognized factors in the production of severe local storms. The origin of storms of this character depends, therefore, upon general atmospheric conditions which promote unseasonable warmth and abnormally high humidity in the regions in which they occur. These conditions usually develop slowly and may be detected, and even anticipated, by means of charted reports of daily meteorological observations that have been simultaneously taken over a large area surrounding the storm threatened district.

As the atmosphere receives its moisture from the water surfaces of the earth it follows that excessive humidity in the central valleys of the United States must be due principally to moisture laden air from the Atlantic or the Gulf of Mexico, and it is also apparent that these masses of air from southern latitudes possess temperatures that are higher than the average temperature of the more northern districts over which they are carried. The mechanical processes that are employed in producing a flow of warm, moist southerly winds over the interior districts of the United States obey the laws of cyclonic and anticyclonic wind circulation, and are illustrated on the daily weather maps.

General barometric conditions favorable for a persistent and strong flow of southerly winds over the Mississippi and lower Missouri valleys appeared May 15. From that date until the 27th the barometer continued low over the Rocky Mountain region and the Missouri Valley and high over the Atlantic and Pacific coast districts. During the 27th an area of low barometric pressure passed northeastward to the upper Lake region, and after that date a barometric disturbance drifted slowly eastward from the middle-eastern Rocky Mountain slope to the